

## II.—RAPHYRUS HIXONII.

## A NEW GIGANTIC SPONGE FROM PORT JACKSON.

In 1862 Oscar Schmidt described two sponges (1) as *Papillina suberea* and *nigricans* from the Mediterranean. In 1866 Bowerbank (2) described a sponge as *Raphyrus griffithsii* which has also been figured (3.) Oscar Schmidt (4), afterwards combined this *Raphyrus* of Bowerbank with his own *Papillina suberea*, an arrangement which has been also adopted by Norman. (5)

According to this the genera *Raphyrus* (Bowerbank), and *Papillina* (O. Schmidt), would appear identical. Among the Australian Sponges there are forms which doubtlessly belong to the genus *Papillina* (O. Schmidt), whereas others again appear very different from these and coincide with Bowerbank's *Raphyrus*. All however, contain besides the *bulb ac*, the pin-shaped spicules, also *tr. tr. sp.* I assume that these also occur in the European species, but escaped the observation of Bowerbank and O. Schmidt. I think that both these genera should be retained. In *Papillina* the internal cavities are irregular and large, in *Raphyrus* they are very similar to the cells of a honeycomb, smaller and very regular.

The species to be described below, belongs to the latter genus, it is fairly abundant in Port Jackson. Numerous specimens measuring 20 x 30 C. m., have been dredged, their shape was bulbous and irregular; recently a specimen of unusual dimensions was brought up with the dredge. It is the largest Australian Sponge hitherto observed by me.

It is named after Captain Hixon, the President of the Marine Board.

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(1) *O. Schmidt*, die Spongien des Adriatischen. Meers 1862. Seite 69.

(2) *J. Bowerbank*. Monograph of the British Sponges. (Ray. Society.) Vol. II., p. 354.

(3) *J. Bowerbank*. Monograph of the British Sponges. (Ray. Society.) Vol. III., pl. LXIV.

(4) *O. Schmidt*. Grundzüge einer Spongienfauna des Atlantischen Gebietes, 1870. Seite 77.

(5) *A. M. Norman*. Monograph of the British Sponges, by the late J. S. Bowerbank. Ray. Society.) Vol. IV. Supplementary, p. 182.

## RAPHYRUS HIXONII. Nov. spec.

## SHAPE AND SIZE.

The smaller specimens are irregular, bulbous, with several vents on the upper convex surface. The large specimen (fig. 6), is massive, expanded above and was attached to the sand of the sea bottom by a flat expanded base, measuring 300 mm. across. It extends above very much. The upper surface is uneven, and horizontal (fig. 6.) Seen from above the out-line appears very irregular with lobate projections beyond a circular circumference. The sponge measures about 600 mm. in width, and 350 mm. in height. There are massive semi-spherical projections over the sides and upper surface. The latter are particularly regular and well-defined. These protruberances extend 50 mm. over the depressions between them and are 120 mm. wide. In the large specimen there are nine such protruberances on the upper side. In the centre of each a vent is situated. In the smaller specimens these vents are scattered over the smooth and uniform surface of the convex upper side. In the large specimen they are found in the centres of the upper protruberances.

These vents are not Oscula but only Pseudoscula. They lead into short conic tubes, pseudogasters.

In the large specimen (fig. 6), there are according to the above, nine such Pseudoscular tubes 260 mm. long and at the mouth 30 mm. wide. They are straight, but not regularly conic as occasionally there are extensions half-way down, whereby their diameter may be locally increased to 50 mm. All these tubes are vertical and open on the upper, laterally expanded surface (fig. 6), on the summits of the protruberances.

The sponge weighed when fresh, about 200 kilogramm. Now that it has been dried, it weighs about 14 kilogramm.

## RIGIDITY.

Alive in spirits and dry, the sponge is very hard, a pressure of 70 kilogramm in no way affects a surface of 50 □ C. m.

## COLOUR.

The colour in the living state is a very bright red, similar to Rosanilin-red. In spirits the sponge becomes pale flesh-coloured, and dried it appears brown. The spirits extract a deep orange-coloured pignut, very similar to that extracted by spirits from many other Monactinellidæ.

## SURFACE.

The surface is reticulated throughout in a very regular and uniform manner, and appears thereby similar to Bowerbank's *Raphyrus Griffithsi*, and also to some species of *Halme* among horny sponges. Young and old specimens always show the same reticulation on the surface, there seem never to be Papillæ in the place of the meshes, as it is the case in young specimens of the genus *Papillina* (O. Schmidt), which, according to that author, is identical with *Raphyrus*. As stated above, however, I consider these genera distinct.

The reticulation is produced by a very regular network of projecting lines on an average 2 mm. wide. In the meshes between these there are slight depressions, about 4-5 mm. deep. The meshes themselves have a width of 3-4 mm. The membrane which is thus expanded below the surface in the meshes is very soft, whereas the projecting lines are exceedingly hard. This membrane is also slightly concave. In it we find very small pores in groups, which are the commencement of the inhalent system.

This network covers the whole of the surface of the sponge and extends downwards into the conic pseudoscular tubes to their bottom.

Oscula are found scattered irregularly over the whole of the surface; they are circular and measure from 2-10 mm. in diameter. These oscula are as frequent on the exposed parts of the sponge as in the sides of the conic pseudoscula.

## CANAL SYSTEM.

The whole sponge consists like the Auleninae described in Part V. of the Monograph of Australian Sponges in the last number of the proceedings of this Society, of a reticulate structure in its interior. (Fig. 8.) Lamellous fibres, with an average thickness of 1 mm. form a network, which on any section appears very regular. These fibres consist of a very hard tissue, with few and small canals and a great abundance of spicules. In the meshes between them (fig. 8) there is a very much softer tissue with wider canals or irregular lacunes. Here only few and insignificant spicules are found.

Below the poresieves in the concave membranes which extend in the meshes of the surface-network, large irregular cavities (fig. 16) are met with. The pores are situated, as stated above, in small groups. The sieve membrane is very thin and delicate. The pores can apparently be entirely closed by the sponge. The subdermal cavity extends far down and gives off branches which ramify to supply the ciliated chambers or extend to form lacunae in other meshes of the interior of the sponge. Most of the lacunae found throughout the interior of the Sponge belong to the inhalent system. Some of the final ramifications of the inhalent system are met with in the fibres of the internal network.

The ciliated chambers are small and difficult to see, they are spherical and measure 0.02 mm. in diameter; from the chambers very narrow canals originate and unite to form larger exhalent canals. The chambers seem to be situated in groups. Such groups occur only in the tissue of the hard fibres, as also in the soft pulpa which occupies the meshes.

The exhalent canals do not form extensive lacunae at all. The larger branches and stems are found only in the soft tissue of the meshes. The oscular tubes follow the net-work in their lower part, and are therefore much curved. They are narrow and long and ramify in an irregular manner.

## SKELETON.

The skeleton consists of the *bulb ac.* and *tr. ac.* spicules already described by Bowerbank and O. Schmidt of their genera *Raphyrus* and *Papillina*, to which two other kinds of spicules, observed in our species, must be added.

## SURFACE SKELETON.

The surface of the hard projecting ridges in the surface net is occupied by a number of small spicules, which form a layer about 0.06 mm. thick. (Fig. 16.) These spicules (figs. 13, 14) are very variable in their shape, straight or curved, with large and irregular spines all over the surface and particularly at the ends. They could be termed *tr. tr. sp.* They are of very uniform size and measure 0.03 mm. in length and 0.007 mm. in thickness. Besides forming a dense armour on the projecting ridges they are found scattered also in the concave membranes of the meshes.

## SKELETON OF THE HARD FIBRES.

The main support of the whole sponge is constituted by a reticulate mass of truncate and bulbous spicules, which are mostly situated longitudinally, and disposed in such a manner as to point towards the free surface (fig. 16) in the projecting ridges, or towards the pulpa in the meshes in the interior.

These spicules are not cemented together by any horny substance. They are very abundant, and form hard, dense masses (fig. 16) throughout the fibres of the interior. Scattered, these spicules are also found rarely in the soft pulpa of the meshes in the interior. These spicules are of uniform size 0.5 mm. long and 0.02 mm. thick. They are cylindrical and abruptly pointed (fig. 9.) The bulb of the majority of spicules measures 0.03 mm. in diameter. Sometimes it increases to a diameter of 0.0036 mm., and may have indications of points at its greatest diameter (fig. 10.)

One of these points may grow out to form a spine 0.09 mm. long (fig. 11.) This however, is rare.

On the other hand the bulb may be absent altogether. *Tr. ac.* spicules are not unfrequent.

## SKELETON OF THE PULPA.

The soft tissue in the meshes contains besides scattered spicules of both the preceding kinds, also small clusters of very slender and gracefully curved *ac. ac. sp.* (fig. 15.) The clusters of these are found scattered irregularly throughout the soft tissue, and comprise from 7 to 12 spicules crossing each other in a perfectly irregular manner (fig. 16.)

These spicules attain a length of 0.2 mm., and a thickness of 0.003 mm. They bear short and sharp spines (fig. 15.)

## HISTOLOGY.

In the soft tissue of the internal meshes, extraordinary granular cells are met with in great abundance (fig 17.) These are highly colourable and probably homologous to those elements, which I have described of Aphrodite Nardorus. (1) There we find likewise a great number of similar cells of a very peculiar appearance in the walls of the lacunes which belong to the inhalent system.

The shape of these elements in *Raphyrus Hixonii*, is subject to very great variations. The cells are spherical, about 90% of them, or irregularly lobate, 2% ; or spindle-shaped, 6% ; or also show indications of dividing as represented in the figure, 2% (fig. 17.) A nucleus is indicated by a more transparent patch in the centre, but not clearly visible. In coloured specimens the whole cell, or rather the granules take up so much colouring matter, that the whole structure is rendered intransparent. The reason that the nucleus in the fresh state and in spirit specimens appears light and transparent, is that the substance of the nucleus is free from granules.

The granules are large and refract the light very strongly. The differences in shape between these cells, lead me to assume that they are a peculiar kind of amoeboid wandering cell.

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(1) *R. v. Lendenfeld*. A Monograph of the Australian Sponges. Part V. The Auleniinae. Proceedings of the Linnean Society of N. S. W. Vol. X., part 3.

I further assume that in this case, as also in *Aphrodite*, these cells are in connection with the digestive functions of the sponge, and take up and absorb microscopic food-particles, which may get into the lacunæ of the inhalent system, and there come in contact with the epithelium.

#### GEOGRAPHICAL DISTRIBUTION.

East Coast of Australia, Port Jackson (Ramsay.)

#### BATHYMETRICAL DISTRIBUTION.

40 metres.

The type specimens of this sponge are in the Australian Museum, Sydney.

### III.—HALME TINGENS.

#### A SPONGE WITH REMARKABLE COLOURING POWER.

Among the sponges sent by Dr. Haacke from Thursday Island, is a new species of my genus *Halme*.

#### HALME TINGENS. Nov. spec.

Sponge composed of reticulate lamella, massive 200 x 300 x 100 mm. large. No dermal lamella. Meshes on an average 12 mm. wide. Lamella curved 2-3 mm. thick, covered with small conuli. Very little sand in the skin. Skeleton composed of very distant fine fibres. Radial main fibres charged with foreign bodies and tangential connecting fibres free from such. Colour in spirits at first white, then violet.

The spirit extracts a yellow colour from the sponge, which appears to remain in solution in the spirits. This sponge was dredged by Dr. Haacke at Thursday Island.

It is an intermediate form connecting the sub-family *Auleninæ* with the genus *Hippospongia*.

*Halme tingens* is very peculiar inasmuch as it colours paper and other substances with a dark violet tint. If paper is inserted in a bottle containing this sponge and spirits, it will be